Magnetars: Challenging the extremes of nature

Abstract

Magnetars are magnetically powered rotating neutron stars with extreme magnetic fields (over 10^14 Gauss). They are discovered and emit predominantly in the X- and gamma-rays. Very few sources (roughly 15) have been found since their discovery in 1987. NASA's Fermi Observatory was launched June 11, 2009; the Fermi Gamma Ray Burst Monitor (GBM) began normal operations on July 14, about a month after launch, when the trigger algorithms were enabled. Since then, we recorded emission from four magnetar sources; of these, only one was an 'old' magnetar: SGR 1806+20. The other three detections were two brand new sources, SGR J0501+4516, discovered with Swift and extensively monitored with both Swift and GBM, SGR J0418+5729, discovered with GBM and the Interplanetary Network (IPN), and SGR J1550-5418, a source originally classified as an Anomalous X-ray Pulsar (AXP 1E1547.0-5408). In my talk I will give a short history of the discovery of magnetars and describe how this, once relatively esoteric field, has emerged as a link between several astrophysical areas including Gamma-Ray Bursts. Finally, I will describe the properties of these sources and the current status of our knowledge of the magnetar population and birth rate.